| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|

Hazardous Wastes from Non-specific Sources:

| | |
|---|---|
| F001 (T) | The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004 and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |
| F002 (T) | The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-triflouroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001,F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |
| F003 (I) | The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |
| F004 (T) | The following spent non-halogenated solvents: Cresols and cresylic acid, nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |
| F005 (I,T) | The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, and pyridine; benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. |
| F006 (T) | Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| | | and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum. |
| F007 | (R,T) | Spent cyanide plating bath solutions from electroplating operations |
| F008 | (R,T) | Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process. |
| F009 | (R,T) | Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process. |
| F010 | (R,T) | Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process. |
| F011 | (R,T) | Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations |
| F012 | (T) | Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process. |
| F019 | (T) | Wastewater treatment sludges from the chemical conversion coating of aluminum. |
| F024 | (T) | Process wastes, including but not limited to distillation residues, heavy ends, tars, and reactor clean-out wastes from the production of chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in 261.31 or 261.32). |
| F025 (T) | Condensed light ends, spent filters and filter aids and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five with varying amounts and positions of chlorine substitution. |
| F032 (T) | Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with ' 261.35 of this chapter and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediments sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. |
| F034 (T) | Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | pentachlorophenol. |
| F035 (T) | Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. |
| F037 (T) | Petroleum refinery primary oil/water/solids separation sludge--Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in ' 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units). and K051 wastes are not included in this listing. |
| F038 (T) | Petroleum refinery secondary (emulsified) |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | oil/water/solids separation sludge--Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in ' 261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing. |
| F039 [1] | Leachate resulting from the treatment, storage, or disposal of wastes classified by more than one waste code under Subpart D, or from a mixture of wastes classified under Subparts C and D of this part. (Leachate resulting from the management of one or more of the following EPA Hazardous Wastes and no other hazardous wastes retains its hazardous waste code(s): F020, F021, F022, F023, F026, F027, and/or F028). |

[1]All constituents for which treatment standards are specified for multi-source leachate (wastewaters and non-wastewaters) under 40 CFR 268.43(a), Table CCW.

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|

Hazardous Wastes from Specific Sources:

| | |
|---|---|
| K001 (T) | Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol. |
| K002 (T) | Wastewater treatment sludge from the production of chrome yellow and orange pigments. |
| K003 (T) | Wastewater treatment sludge from the production of molybdate orange pigments. |
| K004 (T) | Wastewater treatment sludge from the production of zinc yellow pigments. |
| K005 (T) | Wastewater treatment sludge from the production of chrome green pigments. |
| K006 (T) | Wastewater treatment sludge from the production of chrome oxide green pigments. |
| K007 (T) | Wastewater treatment sludge from the production of iron blue pigments. |
| K008 (T) | Oven residue from the production of chrome oxide green pigments. |
| K009 (T) | Distillation bottoms from the production of acetaldehyde from ethylene. |
| K010 (T) | Distillation side cuts from the production of acetaldehyde from ethylene. |
| K011 (R,T) | Bottom stream from the wastewater stripper in the production of acrylonitrile. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K013 (R,T) | Bottom stream from the acetonitrile column in the production of acrylonitrile. |
| K014 (T) | Bottoms from the acetonitrile purification column in the production of acrylonitrile. |
| K015 (T) | Still bottoms from the distillation of benzyl chloride. |
| K016 (T) | Heavy ends or distillation residues from the production of carbon tetrachloride. |
| K017 (T) | Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin. |
| K018 (T) | Heavy ends from the fractionation column in ethyl chloride production. |
| K019 (T) | Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production. |
| K020 (T) | Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production. |
| K021 (T) | Aqueous spent antimony catalyst waste from fluoromethanes production. |
| K022 (T) | Distillation bottom tars from the production of phenol/acetone from cumene. |
| K023 (T) | Distillation light ends from the production of phthalic anhydride from naphthalene. |
| K024 (T) | Distillation bottoms from the production of phthalic anhydride from naphthalene. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K025 (T) | Distillation bottoms from the production of nitrobenzene by the nitration of benzene. |
| K026 (T) | Stripping still tails from the production of methy ethyl pyridines. |
| K027 (R,T) | Centrifuge and distillation residues from toluene diisocyanate production. |
| K028 (T) | Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane. |
| K029 (T) | Waste from the product steam stripper in the production of 1,1,1-trichloroethane. |
| K030 (T) | Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene. |
| K031 (T) | By-product salts generated in the production of MSMA and cacodylic acid. |
| K032 (T) | Wastewater treatment sludge from the production of chlordane. |
| K033 (T) | Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane. |
| K034 (T) | Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane. |
| K035 (T) | Wastewater treatment sludges generated in the production of creosote. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K036 (T) | Still bottoms from toluene reclamation distillation in the production of disulfoton. |
| K037 (T) | Wastewater treatment sludges from the production of disulfoton. |
| K038 (T) | Wastewater from the washing and stripping of phorate production. |
| K039 (T) | Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate. |
| K040 (T) | Wastewater treatment sludge from the production of phorate. |
| K041 (T) | Wastewater treatment sludge from the production of toxaphene. |
| K042 (T) | Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T. |
| K043 (T) | 2,6-Dichlorophenol waste from the production of 2,4-D. |
| K044 (R) | Wastewater treatment sludges from the manufacturing and processing of explosives. |
| K045 (R) | Spent carbon from the treatment of wastewater containing explosives. |
| K046 (T) | Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K047 (R) | Pink/red water from TNT operations. |
| K048 (T) | Dissolved air flotation (DAF) float from the petroleum refining industry. |
| K049 (T) | Slop oil emulsion solids from the petroleum refining industry. |
| K050 (T) | Heat exchanger bundle cleaning sludge from the petroleum refining industry. |
| K051 (T) | API separator sludge from the petroleum refining industry. |
| K052 (T) | Tank bottoms (leaded) from the petroleum refining industry. |
| K060 (T) | Ammonia still lime sludge from coking operations. |
| K061 (T) | Emission control dust/sludge from the primary production of steel in electric furnaces. |
| K062 (C,T) | Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332). |
| K064 (T) | Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production. |
| K065 (T) | Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities |
| K066 (T) | Sludge from treatment of process wastewater |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | and/or acid plant blowdown from primary zinc production. |
| K069 (T) | Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting this stay, EPA will publish a notice of the action in the Federal Register.) |
| K071 (T) | Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used. |
| K073 (T) | Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production. |
| K083 (T) | Distillation bottoms from aniline production. |
| K084 (T) | Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. |
| K085 (T) | Distillation or fractionation column bottoms from the production of chlorobenzenes. |
| K086 (T) | Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K087 (T) | Decanter tank tar sludge from coking operations. |
| K088 (T) | Spent potliners from primary aluminum reduction. |
| K090 (T) | Emission control dust or sludge from ferrochromiumsilicon production. |
| K091 (T) | Emission control dust or sludge from ferrochromium production. |
| K093 (T) | Distillation light ends from the production of phthalic anhydride from ortho-xylene. |
| K094 (T) | Distillation bottoms from the production of phthalic anhydride from ortho-xylene. |
| K095 (T) | Distillation bottoms from the production of 1,1,1-trichloroethane. |
| K096 (T) | Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane. |
| K097 (T) | Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane. |
| K098 (T) | Untreated process wastewater from the production of toxaphene. |
| K099 (T) | Untreated wastewater from the production of 2,4-D. |
| K100 (T) | Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K101 (T) | Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. |
| K102 (T) | Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. |
| K103 (T) | Process residues from aniline extraction from the production of aniline. |
| K104 (T) | Combined wastewater streams generated from nitrobenzene/aniline production. |
| K105 (T) | Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes. |
| K106 (T) | Wastewater treatment sludge from the mercury cell process in chlorine production. |
| K107 (C,T) | Column bottoms from product seperation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines. |
| K108 (I,T) | Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. |
| K109 (T) | Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| acid | hydrazides. |
| K110 (T) | Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. |
| K111 (C,T) | Product washwaters from the production of dinitrotoluene via nitration of toluene. |
| K112 (T) | Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene. |
| K113 (T) | Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation dinitrotoluene. |
| K114 (T) | Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. |
| K115 (T) | Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. |
| K116 (T) | Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine. |
| K117 (T) | Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | bromination of ethene. |
| K118 (T) | Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene. |
| K123 (T) | Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salt. |
| K124 (T,C) | Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts. |
| K125 (T,C) | Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts. |
| K126 (T) | Baghouse dust and floor sweepings in milling and packaging operations from production or formulation of ethylenebisdithiocarbamic acid and its salts. |
| K131 (C,T) | Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide. |
| K132 (T) | Spent absorbent and wastewater separator solids from the production of methyl bromide. |
| K136 (T) | Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene. |
| K141 (T) | Process residues from the recovery of coal |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludges from coking operations). |
| K142 (T) | Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal. |
| K143 (T) | Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal. |
| K144 (T) | Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal. |
| K145 (T) | Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal. |
| K147 (T) | Tar storage tank residues from coal tar refining. |
| K148 (T) | Residues from coal tar distillation, including, but not limited to, still bottoms. |
| K149 (T) | Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | functional groups. (This waste does not include still bottoms from the distillation of benzyl chloride). |
| K150 (T) | Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| K151 (T) | Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. |
| K156 (T) | Organic Waste (including heavy ends, still bottoms, light ends, spent solvents, filters, and decantates) from the production of carbamates and carbamoyl oximes. |
| K157 (T) | Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. |
| K158 (T) | Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. |
| K159 (T) | Organics from the treatment of thiocarbamate wastes. |
| K160 (T) | Solids (including filter wastes, separation solids, and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes. |
| K161 (T) | Purification solids (including filtration, |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | evaporation, and centrifugation solids), bag house dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.) |
| K169 (T) | Crude oil tank sediment from petroleum refining operations. |
| K170 (T) | Clarified slurry oil sediment from petroleum refining operations. |
| K171 (R,T) | Spent hydrotreating catalyst from petroleum refining operations, including guard beds used to desulfurizefeeds to other catlaytic reactors (this listing does not include inert support media). |
| K172 (R,T) | Spent hydrorefining catalyst from petroleum refining operations. |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| **Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residues Thereof:** | | |
| P001 | (H) | Warfarin, & salts, when present at concentrations greater than 0.3%. |
| P002 | (H) | 1-Acetyl-2-thiourea |
| P003 | (H) | Acrolein |
| P004 | (H) | Aldrin |
| P005 | (H) | Allyl alcohol |
| P006 | (R,T) | Aluminum phosphide |
| P007 | (H) | 5-(Aminomethyl)-3-isoxazolol |
| P008 | (H) | 4-Aminopyridine |
| P009 | (R) | Ammonium picrate |
| P010 | (T) | Arsenic acid $H_3AsO_4$ |
| P011 | (T) | Arsenic pentoxide |
| P012 | (T) | Arsenic trioxide |
| P013 | (H) | Barium cyanide |
| P014 | (T) | Benzenethiol |
| P015 | (H) | Beryllium |
| P016 | (H) | Methane, oxybis[chloro- |
| P017 | (T) | Bromoacetone |
| P018 | (H) | Brucine |
| P020 | (H) | Dinoseb |
| P021 | (H) | Calcium cyanide |
| P022 | (T) | Carbon disulfide |
| P023 | (H) | Chloroacetaldehyde |
| P024 | (H) | p-Chloroaniline |
| P026 | (H) | 1-(o-Chlorophenyl)thiourea |
| P027 | (H) | 3-Chloropropionitrile |
| P028 | (H) | Benzyl chloride |
| P029 | (H) | Copper cyanide |
| P030 | (T) | Cyanides (soluble cyanide salts) not otherwise specified. |
| P031 | (H) | Cyanogen |
| P033 | (H) | Cyanaogen chloride |
| P034 | (T) | 2-Cyclohexyl-4,6-dinitrophenol |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| P036 (H) | Dichlorophenylarsine |
| P037 (H) | Dieldrin |
| P038 (T) | Diethylarsine |
| P039 (T) | Disulfoton |
| P040 (H) | O,O-Diethyl O-pyrazinyl phosphorothioate. |
| P041 (H) | Diethyl-p-nitrophenyl phosphate |
| P042 (H) | Epinephrine |
| P043 (H) | Diisopropylfluorophosphate (DFP) |
| P044 (T) | Dimethoate |
| P045 (H) | Thiofanox |
| P046 (T) | Benzeneethanamine, alpha,alpha-dimethyl- |
| P047 (H) | 4,6-Dinitro-o-cresol, and salts |
| P048 (H) | 2,4-Dinitrophenol |
| P049 (H) | Dithiobiuret |
| P050 (H) | Endosulfan |
| P051 (H) | Endrin |
| P054 (H) | Aziridine |
| P056 (H) | Fluorine |
| P057 (H) | Fluoroacetamide |
| P058 (H) | Fluoroacetic acid, sodium salt |
| P059 (H) | Heptachlor |
| P060 (H) | Isodrin |
| P062 (H) | Hexaethyl tetraphosphate |
| P063 (H) | Hydrogen cyanide |
| P064 (H) | Methyl isocyanate |
| P065 (R,T) | Mercury fulminate |
| P066 (H) | Methomyl |
| P067 (H) | 1,2-Propylenimine |
| P068 (H) | Methyl hydrazine |
| P069 (H) | 2-Methyllactonitrile |
| P070 (H) | Aldicarb |
| P071 (H) | Methyl parathion |
| P072 (H) | alpha-Naphthylthiourea |
| P073 (H) | Nickel carbonyl |
| P074 (H) | Nickel cyanide |
| P075 (T) | Nicotine, and salts |
| P076 (T) | Nitric oxide |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| P077 | (T) | p-Nitroaniline |
| P078 | (H) | Nitrogen dioxide |
| P081 | (R,T) | Nitroglycerine (R) |
| P082 | (H) | N-Nitrosodimethylamine |
| P084 | (H) | N-Nitrosomethylvinylamine |
| P085 | (H) | Octamethylpyrophosphoramide |
| P087 | (H) | Osmium tetroxide |
| P088 | (H) | Endothall |
| P089 | (T) | Parathion |
| P092 | (H) | Phenylmercury acetate |
| P093 | (H) | Phenylthiourea |
| P094 | (T) | Phorate |
| P095 | (T) | Phosgene |
| P096 | (H) | Phosphine |
| P097 | (H) | Famphur |
| P098 | (H) | Potassium cyanide |
| P099 | (H) | Potassium silver cyanide |
| P101 | (H) | Propanenitrile |
| P102 | (H) | Propargyl alcohol |
| P103 | (H) | Selenourea |
| P104 | (H) | Silver cyanide |
| P105 | (H) | Sodium azide |
| P106 | (H) | Sodium cyanide |
| P108 | (T) | Strychnine and salts |
| P109 | (H) | Tetraethyldithiopyrophosphate |
| P110 | (H) | Tetraethyl lead |
| P111 | (H) | Tetraethyl pyrophosphate |
| P112 | (R) | Tetranitromethane |
| P113 | (H) | Thallic oxide |
| P114 | (H) | Thallium(I) selenite |
| P115 | (H) | Thallium(I) sulfate |
| P116 | (H) | Thiosemicarbazide |
| P118 | (H) | Trichloromethanethiol |
| P119 | (H) | Vanadic acid, ammonium salt |
| P120 | (H) | Vanadium pentoxide |
| P121 | (H) | Zinc cyanide |
| P122 | (R,T) | Zinc phosphide $Zn_3P_2$ when present at |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| | |
|---|---|
| | concentrations greater than 10% |
| P123 (H) | Toxaphene |
| P127 | 7-Benzofuranol, 2,3-dihydro-2,2-dimethyl,methylcarbamate (Carbofuran) |
| P128 | Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester) (Mexacarbate) |
| P185 | 1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl, O-[(methylamino)carbonyl]oxime (Tirpate) |
| P188 | Benzoic acid, 2-hydroxy, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro- 1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate) |
| P189 | Carbamic acid,[(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan) |
| P190 | Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb) |
| P191 | Carbamic acid, dimethyl-, 1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan) |
| P192 | Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan) |
| P194 | Ethanimidothioc acid, 2-(dimethylamino)-N-{[(methylamino)carbonyl]oxy}-2-oxo, methyl ester (Oxamyl) |
| P196 | Manganese, bis(dimethylcarbamodithioato-S,S')-(Manganese dimethyldithiocarbamate) |
| P197 | Methanimidamide, N,N-dimethyl-N'-[2- methyl-4-{[(methylamino)carbonyl]oxy}phenyl]-(Formparanate) |
| P198 | Methanimidamide, N,N-dimethyl-N'-[3-{[(methylamino)carbonyl]oxy}phenyl]-, monohydrochloride (Formetanate hydrochloride) |
| P199 | Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate (Methiocarb) |
| P201 | Phenol, 3-methyl-5-(1-methylethyl)-, |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | methylcarbamate (Promecarb) |
| P202 | Phenol, 3-(1-methylethyl), methylcarbamate (Hercules AC-5727) |
| P203 | Propanal, 2-methy-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone) |
| P204 | Pyrrolo(2,3-b)indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl, methylcarbamate (ester), (3aS-cis)- (Physostigmine) |
| P205 | Zinc, bis(dimethylcarbamodithioato-S,S')-, (Ziram) |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|

Commercial Chemical Products, Manufacturing Chemical Intermediates, or Off-Specification Commercial Chemical Products:

| | | |
|---|---|---|
| U001 | (I) | Ethanal |
| U002 | (I) | Acetone |
| U003 | (I,T) | Acetonitrile |
| U004 | (T) | Acetophenone |
| U005 | (T) | 2-Acetylaminofluorene |
| U006 | (C,R,T) | Acetyl chloride |
| U007 | (T) | Acrylamide |
| U008 | (I) | Acrylic acid |
| U009 | (T) | Acrylonitrile |
| U010 | (T) | Mitomycin C |
| U011 | (T) | Amitrole |
| U012 | (I,T) | Aniline |
| U014 | (T) | Auramine |
| U015 | (T) | Azaserine |
| U016 | (T) | Benz[c]acridine |
| U017 | (T) | Benzal chloride |
| U018 | (T) | Benz[a]anthracene |
| U019 | (I,T) | Benzene |
| U020 | (C,R) | Benzenesulfonyl chloride |
| U021 | (T) | Benzidine |
| U022 | (T) | Benzo[a]pyrene |
| U023 | (C,R,T) | Benzotrichloride |
| U024 | (T) | Dichloromethoxy ethane |
| U025 | (T) | Dichloroethyl ether |
| U026 | (T) | Chlornaphazin |
| U027 | (T) | Dichloroisopropyl ether |
| U028 | (T) | Diethylhexyl phthalate |
| U029 | (T) | Methyl bromide |
| U030 | (T) | Benzene, 1-bromo-4-phenoxy- |
| U031 | (I) | n-Butyl alcohol |
| U032 | (T) | Calcium chromate |
| U033 | (R,T) | Carbon oxyfluoride |
| U034 | (T) | Chloral |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| U035 | (T) | Chlorambucil |
| U036 | (T) | Chlordane, alpha & gamma isomers |
| U037 | (T) | Chlorobenzene |
| U038 | (T) | Chlorobenzilate |
| U039 | (T) | p-Chloro-m-cresol |
| U041 | (T) | Epichlorohydrin |
| U042 | (T) | 2-Chloroethyl vinyl ether |
| U043 | (T) | Vinyl chloride |
| U044 | (T) | Chloroform |
| U045 | (I,T) | Methyl chloride |
| U046 | (T) | Chloromethyl methyl ether |
| U047 | (T) | beta-Chloronaphthalene |
| U048 | (T) | o-Chlorophenol |
| U049 | (T) | Benzenamine, 4-chloro-2-methyl-, hydrochloride |
| U050 | (T) | Chrysene |
| U051 | (T) | Creosote |
| U052 | (T) | Cresol (Cresylic Acid) |
| U053 | (T) | Crotonaldehyde |
| U055 | (I) | Cumene |
| U056 | (I) | Cyclohexane |
| U057 | (I) | Cyclohexanone |
| U058 | (T) | Chclophosphamide |
| U059 | (T) | Daunomycin |
| U060 | (T) | DDD |
| U061 | (T) | DDT |
| U062 | (T) | Diallate |
| U063 | (T) | Dibenz[a,h]anthracene |
| U064 | (T) | Dibenzo[a,i]pyrene |
| U066 | (T) | 1,2-Dibromo-3-chloropropane |
| U067 | (T) | Ethylene dibromide |
| U068 | (T) | Methylene bromide |
| U069 | (T) | Dibutyl phthalate |
| U070 | (T) | o-Dichlorobenzene |
| U071 | (T) | m-Dichlorobenzene |
| U072 | (T) | p-Dichlorobenzene |
| U073 | (T) | 3,3'Dichlorobenzidine |
| U074 | (I,T) | 1,4-Dichloro-2-butene |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| U075 | (T) | Dichlorodifluoromethane |
| U076 | (T) | Ethylidene dichloride |
| U077 | (T) | Ethylene dichloride |
| U078 | (T) | 1,1-Dichloroethylene |
| U079 | (T) | 1,2-Dichloroethylene |
| U080 | (T) | Methylene chloride |
| U081 | (T) | 2,4-Dichlorophenol |
| U082 | (T) | 2,6-Dichlorophenol |
| U083 | (T) | Propylene dichloride |
| U084 | (T) | 1,3-Dichloropropene |
| U085 | (I,T) | 1,2:3,4-Diepoxybutane |
| U086 | (T) | N,N-Diethylhydrazine |
| U087 | (T) | O,O-Diethyl S-methyl dithiophosphate |
| U088 | (T) | Diethyl phthalate |
| U089 | (T) | Diethylstilbesterol |
| U090 | (T) | Dihydrosafrole |
| U091 | (T) | 3,3'-Dimethoxybenzidine |
| U092 | (I) | Dimethylamine |
| U093 | (T) | p-Dimethylaminoazobenzene |
| U094 | (T) | 7,12-Dimethylbenz[a]anthracene |
| U095 | (T) | 3,3'-Dimethylbenzidine |
| U096 | (R) | alpha,alpha-Dimethylbenzylhydroperoxide |
| U097 | (T) | Dimethylcarbamoyl chloride |
| U098 | (T) | 1,1-Dimethylhydrazine |
| U099 | (T) | 1,2-Dimethylhydrazine |
| U101 | (T) | 2,4-Dimethylphenol |
| U102 | (T) | Dimethyl phthalate |
| U103 | (T) | Dimethyl sulfate |
| U105 | (T) | 2,4-Dinitrotoluene |
| U106 | (T) | 2,6-Dinitrotoluene |
| U107 | (T) | Di-n-octyl phthalate |
| U108 | (T) | 1,4-Dioxane |
| U109 | (T) | 1,2-Diphenylhydrazine |
| U110 | (I) | Dipropylamine |
| U111 | (T) | Di-n-propylnitrosamine |
| U112 | (I) | Ethyl acetate |
| U113 | (I) | Ethyl acrylate |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| U114 | (T) | Ethylenebisdithiocarbamic acid, salts & esters |
| U115 | (I,T) | Ethylene oxide |
| U116 | (T) | Ethylenethiourea |
| U117 | (I) | Ethyl ether |
| U118 | (T) | Ethyl methacrylate |
| U119 | (T) | Ethyl methanseulfonate |
| U120 | (T) | Fluoranthene |
| U121 | (T) | Methane, trichlorofluoro- |
| U122 | (T) | Formaldehyde |
| U123 | (C,T) | Formic acid |
| U124 | (I) | Furan |
| U125 | (I) | Furfural |
| U126 | (T) | Glycidylaldehyde |
| U127 | (T) | Hexachlorobenzene |
| U128 | (T) | Hexachlorobutadiene |
| U129 | (T) | Lindane |
| U130 | (T) | Hexachlorocyclopentadiene |
| U131 | (T) | Hexachloroethane |
| U132 | (T) | Hexachlorophene |
| U133 | (R,T) | Hydrazine |
| U134 | (C,T) | Hydrogen fluoride |
| U135 | (T) | Hydrogen sulfide |
| U136 | (T) | Cacodylic acid |
| U137 | (T) | Indeno[1,2,3-cd]pyrene |
| U138 | (T) | Methyl iodide |
| U140 | (I,T) | Isobutyl alcohol |
| U141 | (T) | Isosafrole |
| U142 | (T) | Kepone |
| U143 | (T) | Lasiocarpine |
| U144 | (T) | Lead acetate |
| U145 | (T) | Lead phosphate |
| U146 | (T) | Lead subacetate |
| U147 | (T) | Maleic anhydride |
| U148 | (T) | Maleic hydrazide |
| U149 | (T) | Malononitrile |
| U150 | (T) | Melphalan |
| U151 | (T) | Mercury |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| U152 | (I,T) | Methacrylonitrile |
| U153 | (I,T) | Methanethiol |
| U154 | (I) | Methanol |
| U155 | (T) | Methapyrilene |
| U156 | (I,T) | Methyl chlorocarbonate |
| U157 | (T) | 3-Methylcholanthrene |
| U158 | (T) | 4,4'-Methylenebis(2-chloroaniline) |
| U159 | (I,T) | Methyl ethyl ketone (MEK) |
| U160 | (R,T) | Methyl ethyl ketone peroxide |
| U161 | (I) | Methyl isobutyl ketone |
| U162 | (I,T) | Methyl methacrylate |
| U163 | (T) | MNNG |
| U164 | (T) | Methylthiouracil |
| U165 | (T) | Naphthalene |
| U166 | (T) | 1,4-Naphthoquinone |
| U167 | (T) | 1-Naphthalenamine |
| U168 | (T) | 2-Naphthalenamine |
| U169 | (I,T) | Nitrobenzene |
| U170 | (T) | p-Nitrophenol |
| U171 | (I,T) | 2-Nitropropane |
| U172 | (T) | N-Nitrosodi-n-butylamine |
| U173 | (T) | N-Nitrosodiethanolamine |
| U174 | (T) | N-Nitrosodiethylamine |
| U176 | (T) | N-Nitroso-N-ethylurea |
| U177 | (T) | N-Nitroso-N-methylurea |
| U178 | (T) | N-Nitroso-N-methylurethane |
| U179 | (T) | N-Nitrosopiperidine |
| U180 | (T) | N-Nitrosopyrrolidine |
| U181 | (T) | 5-Nitro-o-toluidine |
| U182 | (T) | Paraldehyde |
| U183 | (T) | Pentachlorobenzene |
| U184 | (T) | Pentachloroethane |
| U185 | (T) | Pentachloronitrobenzene (PCNB) |
| U186 | (I) | 1,3-Pentadiene |
| U187 | (T) | Phenacetin |
| U188 | (T) | Phenol |
| U189 | (R) | Phosphorous sulfide |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| U190 | (T) | Phthalic anhydride |
| U191 | (T) | Pyridine, 2-methyl- |
| U192 | (T) | Pronamide |
| U193 | (T) | 1,3-Propane sultone |
| U194 | (I,T) | 1-Propanamine |
| U196 | (T) | Pyridine |
| U197 | (T) | p-Benzoquinone |
| U200 | (T) | Reserpine |
| U201 | (T) | Resorcinol |
| U202 | (T) | Saccharin, and salts |
| U203 | (T) | Safrole |
| U204 | (T) | Selenium dioxide |
| U205 | (R,T) | Selenium sulfide |
| U206 | (T) | Streptozotocin |
| U207 | (T) | 1,2,4,5-Tetrachlorobenzene |
| U208 | (T) | 1,1,1,2-Tetrachloroethane |
| U209 | (T) | 1,1,2,2-Tetrachloroethane |
| U210 | (T) | Tetrachloroethylene |
| U211 | (T) | Carbon tetrachloride |
| U213 | (I) | Tetrahydrofuran |
| U214 | (T) | Thallium(I) acetate |
| U215 | (T) | Thallium(I) carbonate |
| U216 | (T) | Thallium(I) chloride |
| U217 | (T) | Thallium(I) nitrate |
| U218 | (T) | Thioacetamide |
| U219 | (T) | Thiourea |
| U220 | (T) | Toluene |
| U221 | (T) | Toluenediamine |
| U222 | (T) | o-Toluidine hydrochloride |
| U223 | (R,T) | Toluene diisocyanate |
| U225 | (T) | Bromoform |
| U226 | (T) | Methyl chloroform |
| U227 | (T) | 1,1,2-Trichloroethane |
| U228 | (T) | Trichloroethylene |
| U234 | (R,T) | 1,3,5-Trinitrobenzene |
| U235 | (T) | Tris(2,3-dibromopropyl) phosphate |
| U236 | (T) | Trypan blue |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | | Hazardous Waste/Constituent: |
|---|---|---|
| U237 | (T) | Uracil mustard |
| U238 | (T) | Ethyl carbamate (urethane) |
| U239 | (I) | Xylene |
| U240 | (T) | 2,4-D, salts and esters |
| U243 | (T) | Hexachloropropene |
| U244 | (T) | Thiram |
| U246 | (T) | Cyanogen bromide (CN)Br |
| U247 | (T) | Methoxychlor |
| U248 | (T) | Warfarin, and salts, when present at concentrations of 0.3% or less. |
| U249 | (T) | Zinc phosphide, $Zn_3P_2$ when present at concentrations of 10% or less. |
| U271 | | Carbamic acid, {1-[(butylamino)carbonyl]-1H-benzamidazol-2-yl}-, methyl ester (Benomyl) |
| U277 | | Carbamodithioic acid, diethyl-,2-chloro-2-propenyl esters (Sulfallate) |
| U278 | | 1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb) |
| U279 | | 1-Naphthalenol, methylcarbamate (Carbaryl) |
| U280 | | Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban) |
| U328 | (T) | o-Toluidine |
| U353 | (T) | p-Toluidine |
| U359 | (T) | Ethanol, 2-ethoxy- |
| U364 | | 1,3-benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol) |
| U365 | | 1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ether (Molinate) |
| U366 | | 2H-1,3,5-thiadiazine-2-thione, tetrahydro-3,5-dimethyl- (Dazomet) |
| U367 | | 7-Benzofuranol, 2,3-dihydro-2,2-dimethyl- (Carbofuran phenol) |
| U372 | | Carbamic acid, 1H-benzomidazol-2-yl, methyl ester (Carbendazim) |
| U373 | | Carbamic acid, phenyl-, 1-methylethyl ether (Propham) |
| U375 | | Carbamic acid, butyl-, 3-idio-2-propynyl ester |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | (Troysan Plyphase) |
| U376 | Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid (Seleneum dimethyldithiocarbamate) |
| U377 | Carbamodithioic acid, methyl, -monopotassium salt (Potassium n-methyldithiocarbamate) |
| U378 | Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt (Busan 40) |
| U379 | Carbamodithioic acid, dibutyl, sodium salt (Sodium dibutyldithiocarbamate) |
| U381 | Carbamodithioic acid, diethyl-, sodium salt (Sodium diethyldithiocarbamate) |
| U382 | Carbamodithioic acid, dimethyl-, sidium salt (Dibam) |
| U383 | Carbamodithioic acid, dimethyl, porassium salt (Potassium dimethyl dithiocarbamate) (Busan 85) |
| U384 | Carbamodithioic acid, methyl-, monosodium salt (Metam Sodium) |
| U385 | Carbamodithioic acid, dipropyl-, S-propyl ester (Vemolate) |
| U386 | Carbamodithioic acid, cyclohexylethyl, S-ethyl ester (Cycloate) |
| U387 | Carbamodithioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb) |
| U389 | Carbamodithioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate) |
| U390 | Carbamodithioic acid, dipropyl-, S-ethyl ester (EPTC) |
| U391 | Carbamodithioic acid, butylethyl-, E-propyl ester (Pebulate) |
| U392 | Carbamodithioic acid, bis(2-methylpropyl)-, S-ethyl ester (Butylate) |
| U393 | Copper, tris(dimethylcarbamodithioato- S,S')-, (Copper dimethyldithiocarbamate) |
| U394 | Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ether (A2213) |
| U395 | Ethanol, 2,2'-oxybis-, dicarbamate (Reactacrease |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

| EPA Hazardous Waste Number: | Hazardous Waste/Constituent: |
|---|---|
| | 4-DEG) |
| U396 | Iron, tris(dimethyl carbamodithioato-S,S')-(Ferbam) |
| U400 | Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis-(Sulfads) |
| U401 | Bis(dimethyl thiocarbamoyl) sulfide (Tetramethylthiuram monosulfide) |
| U402 | Thioperoxydicarbonic diamide, tetrabutyl (Butyl Tuads) |
| U403 | Thioperoxydicarbonic diamide, tetraethyl (Disulfram) |
| U404 | Ethanamine, N,N-diethyl- (Triethylamine) |
| U407 | Zinc, bis(diethylcarbamodithioato-S,S') (Ethyl Ziram) |
| U409 | Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl) |
| U410 | Ethanomidothoic acid, N,N'-{thiobis[(methylimino)carbonyloxy]}bis-, dimethyl ester (Thiodicarb) |
| U411 | Phenol, 2-(1-methylethoxy)-, methylcarbamate (Propoxur) |

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

Other Wastes

- Solid wastes as defined by 40 CFR 261.2
- Waste from a Hazardous Waste Facility or Site, or waste resulting from activities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) including but not limited to personnel protective equipment, discarded containers of laboratory chemicals (lab packs), lab equipment, clothing, debris from spills or cleanup and floor sweepings.

Basis for listing or class of hazardous waste:

| | | | |
|---|---|---|---|
| (I) | Ignitable | Toxicity Characteristic Waste | (E) |
| (C) | Corrosive | Acute Hazardous Waste | (H) |
| (R) | Reactive | Toxic Waste | (T) |

# Attachment C-C
# Analytical Methods

# Attachment C-C

## Table of Contents:

## Standard Method References

The standard methods referenced on the following pages are detailed in the publications provided below.

| | |
|---|---|
| SW-846 | "Test Methods for Evaluating Solid Waste"; SW-846; U.S. Environmental Protection Agency, Office of Water and Waste Management, Washington, D.C. 20406; in effect as of January 31, 1992. |
| APHA | "Standard Methods for the Examination of Water and Waste Water", 16th edition, American Public Health Association, 1985. |
| ASTM | "Annual Book of ASTM Standards", American Society for Testing Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. |
| EPA-600/4-79-020 | "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020; U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, March 1979. |
| 40 CFR | 40 Code of Federal Regulations, Parts 260-268 (1991 edition). |

Examples of Standard Test Methods and Procedures
and LES Analytical Procedures [6 pages]

| Parameter | Method | Reference |
|---|---|---|
| **Sample Work Up Techniques** | | |
| **Inorganic Techniques** | | |
| Acid digestion procedure for flame atomic absorption spectroscopy or inductively coupled plasma spectroscopy | 3005 | SW-846 |
| Acid digestion procedure for flame atomic absorption spectroscopy or inductively coupled plasma spectroscopy | 3010 | SW-846 |
| Acid digestion procedure for furnace atomic absorption spectroscopy | 3020 | SW-846 |
| Acid digestion of oils, greases, or waxes | 3030 | SW-846 |
| Dissolution procedure for oils, greases, wax | 3040 | SW-846 |
| Acid digestion of sludges | 3050 | SW-846 |
| Alkaline digestion | 3060 | SW-846 |
| Microwave assisted acid digestions from USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis | | EPA-CLP |
| **Organic Techniques** | | |
| Extraction Procedure for Oily Wastes | 1330 | SW-846 |
| Organic Extraction and Sample Preparation | 3500 | SW-846 |
| Waste Dilution | 3580 | SW-846 |
| Separatory funnel liquid-liquid extraction | 3510 | SW-846 |
| Continuous liquid-liquid extraction | 3520 | SW-846 |
| Acid-base cleanup extraction | 3530 | SW-846 |
| Soxhlet extraction | 3540 | SW-846 |
| Sonication extraction | 3550 | SW-846 |
| Purge and Trap | 5030 | SW-846 |
| Hexadecane Extraction and Screening of purgeable organics | 3820 | SW-846 |

| Inorganic Analytical Methods | | |
|---|---|---|
| Inductively coupled plasma atomic emission spectroscopy | 6010 | SW-846 |
| Antimony | | |
| Atomic absorption, direct aspiration method | 7040 | SW-846 |
| Atomic absorption, furnace method | 7041 | SW-846 |
| Arsenic | | |
| Atomic absorption, furnace method | 7060 | SW-846 |
| Atomic absorption, gaseous hydride method | 7061 | SW-846 |
| Barium | | |
| Atomic absorption, direct aspiration method | 7080 | SW-846 |
| Atomic absorption, furnace method | 7081 | SW-846 |
| Beryllium | | |
| Atomic absorption, direct aspiration method | 7090 | SW-846 |
| Atomic absorption, furnace method | 7091 | SW-846 |
| Cadmium | | |
| Atomic absorption, direct aspiration method | 7130 | SW-846 |
| Atomic absorption, furnace method | 7131 | SW-846 |
| Chromium | | |
| Atomic absorption, direct aspiration method | 7190 | SW-846 |
| Atomic absorption, furnace method | 7191 | SW-846 |
| Hexavalent chromium: co-precipitation | 7195 | SW-846 |
| Hexavalent chromium: colorimetric | 7196 | SW-846 |
| Hexavalent chromium: chelation-extraction | 7197 | SW-846 |
| Hexavalent chromium: diff. phase polarography | 7198 | SW-846 |
| Copper | | |
| Atomic absorption, direct aspiration method | 7210 | SW-846 |
| Atomic absorption, furnace method | 7211 | SW-846 |
| Lead | | |
| Atomic absorption, direct aspiration method | 7420 | SW-846 |
| Atomic absorption, furnace method | 7421 | SW-846 |

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|---|---|---|
| Mercury | | |
| In liquid waste (manual cold-vapor technique) | 7470 | SW-846 |
| In solid or semisolid waste (manual cold-vapor technique) | 7471 | SW-846 |
| Nickel | | |
| Atomic absorption, direct aspiration method | 7520 | SW-846 |
| Atomic absorption, furnace method | 7521 | SW-846 |
| Osmium | | |
| Atomic absorption, direct aspiration method | 7550 | SW-846 |
| Atomic absorption, furnace method | 7551 | SW-846 |
| Selenium | | |
| Atomic absorption, furnace method | 7740 | SW-846 |
| Atomic absorption, gaseous hydride method | 7741 | SW-846 |
| Silver | | |
| Atomic absorption, direct aspiration method | 7760 | SW-846 |
| Atomic absorption, furnace method | 7761 | SW-846 |
| Thallium | | |
| Atomic absorption, direct aspiration method | 7840 | SW-846 |
| Atomic absorption, furnace method | 7841 | SW-846 |
| Vanadium | | |
| Atomic absorption, direct aspiration method | 7910 | SW-846 |
| Atomic absorption, furnace method | 7911 | SW-846 |
| Zinc | | |
| Atomic absorption, direct aspiration method | 7950 | SW-846 |
| Atomic absorption, furnace method | 7951 | SW-846 |

| Organic Analytical Methods | | |
|---|---|---|
| **Gas Chromatographic Methods** | | |
| Halogenated Volatile Organics | 8010 | SW-846 |
| Nonhalogenated Volatile Organics | 8015 | SW-846 |
| Aromatic Volatile Organics | 8020 | SW-846 |
| Acrolein, Acrylonitrile, Acetonitrile | 8030 | SW-846 |
| Phenols | 8040 | SW-846 |
| Phthalate Esters | 8060 | SW-846 |
| Organochloride Pesticides and PCBs | 8080 | SW-846 |
| Nitroaromatics and Cyclic Ketones | 8090 | SW-846 |
| Polynuclear Aromatic Hydrocarbons | 8100 | SW-846 |
| Chlorinated Hydrocarbons | 8120 | SW-846 |
| Organophosphate Pesticides | 8140 | SW-846 |
| Chlorinated Herbicides | 8150 | SW-846 |
| **Gas Chromatographic/Mass Spectroscopy Methods for Organics** | | |
| Volatile Organics | 8240 | SW-846 |
| Volatile Organics | 8260 | SW-846 |
| Semivolatile Organics: | | |
| Packed Column Technique | 8250 | SW-846 |
| Capillary Column Technique | 8270 | SW-846 |
| Polychlorinated Dibenzo-P-Dioxins and Polychlorinated Dibenzofurans | 8280 | SW-846 |

| Miscellaneous Analytical Methods | | |
|---|---|---|
| Acidity | 402 | APHA |
| Alkalinity | 403 | APHA |
| Percent Ash | D482 | ASTM |
| Bulk Density | D1429 | ASTM |
| Chlorine | D808 | ASTM |
| Compatibility Test for Wastes and Membrane Liners | 9090 | SW-846 |
| Corrosivity towards steel | 1110 | SW-846 |
| Releasable Cyanides | 7.3.3.2 | SW-846 |
| Releasable Sulfides | 7.3.4.2 | SW-846 |
| Flash Point (closed cup) | D93 | ASTM |
| Flash Point (open cup) | D92 | ASTM |
| Heat Release | D240 | ASTM |
| Ignitability (Pensky-Martens closed-cup method) | 1010 | SW-846 |
| Ignitability (Setaflash closed-cup method) | 1020 | SW-846 |
| $NH_3$-Nitrogen | 350.3 | EPA-600/ 4-79-020 |
| $NH_3$-Nitrogen | 417 | APHA |
| Nitrate (Ion Chromatography) | 300.1 | EPA-600/ 4-79-020 |
| Nitrate (Colormetric) | 9200 | SW-846 |
| Nitrate-Nitrogen | 418 | APHA |
| Nitrate-Nitrogen | 352.1 | EPA-600/ 4-79-020 |
| Total Recoverable Oil & Grease | 9070 | SW-846 |
| Oil & Grease Extraction Method for Sludge Samples | 9071 | SW-846 |
| Oil & Grease | D4281 | ASTM |
| Oil & Grease | 503 | APHA |
| Total Organic Carbon (TOC) | 9060 | SW-846 |
| Total Organic Halides (TOX) | 9020 | SW-846 |
| Paint Filter Liquids Test (Free Liquids Test) | 9095 | SW-846 |
| Soil pH | 9045 | SW-846 |
| Phosphorous | 365.4 | EPA-600/ 4-79-020 |
| Phosphorous | 424 | APHA |
| Total Solids Dried at 103°C - 105°C | 160.3 | EPA-600/ 4-79-020 |
| Total Solids Dried at 103°C - 105°C | 209A | APHA |
| Total Suspended Solids (Filterable Residue) | 209C | APHA |
| Fixed & Volatile Solids (Non-filterable Residue) 2-209D | 209D | APHA |
| Specific Gravity | D1298 | ASTM |
| Total Sulfur | D129-64 | ASTM |
| Total Sulfides | 9030 | SW-846 |
| TCLP | Appendix I | 40 CFR 268 |
| EP Toxicity | Appendix II | 40 CFR 261 |

| | | |
|---|---|---|
| Viscosity | D445 | ASTM |
| Water Content (Karl Fischer Method) | D1744 | ASTM |
| Water Content (Centrifuge Method) | D1796 | ASTM |
| Normality | USPCI-1 | CHK WAP |
| Water Reactivity Screen | USPCI-2 | CHK WAP |
| Solids Screen | USPCI-3 | CHK WAP |
| Reactive Cyanides Screen | USPCI-4 | CHK WAP |
| Reactive Sulfides Screen | USPCI-4 | CHK WAP |
| Explosivity Screen | HRW-1 | CHK WAP |
| Explosivity Meter Vapor Test | USPCI-5 | CHK WAP |
| Oxidizer Screen | USPCI-6 | CHK WAP |
| Radioactivity Screen | USPCI-7 | CHK WAP |
| Fixation Requirement | USPCI-8 | CHK WAP |
| Reducer Screen | USPCI-10 | CHK WAP |
| Extraction for Solids | USPCI-11 | CHK WAP |
| Radiant Heat Ignition Test | USPCI-21 | CHK WAP |
| Ignitability of Solids | HRIW-3 | CHK WAP |
| Compatability Evaluation | USPCI-25 | CHK WAP |
| HOC Screen | HRIW-2 | CHK WAP |

Clean Harbors Kansas, LLC

Analytical Procedures

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 1

## NORMALITY

Revision No.13
September 03,2010

Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 1

# NORMALITY

## (Acidity or Alkalinity)

## 1.0 SCOPE AND APPLICATION

1.1 This method is for determining normality (acidity or alkalinity) of hazardous waste samples that are acidic or caustic liquids.

1.2 It should be noted that the data generated from normality measurements are used for two purposes. One is as a part of the incoming load (fingerprint) procedure to ensure that pre-shipment samples of waste streams are representative of the loads actually sent. A difference of +/-1.25 normality units is considered a discrepancy. The other purpose is to give an indication of the volumes of acidic and caustic waste streams that must be mixed together for neutralization before disposal. Neither of these purposes require accurate values for low normality samples. Therefore, the procedure which is used and given here is one that gives sufficient accuracy for high normality samples.

## 2.0 SUMMARY OF METHOD

2.1 The liquid waste is titrated with a titrant that is the opposite pH (e.g. titrate an acidic waste with a caustic titrant). Solids are added to a nominal volume of deionized water (DIW) for titration, if desired. The normality is calculated by using the amounts of the sample and titrant and the known normality of the titrant. The end point of the titration is determined by a calibrated pH meter.

## 3.0 INTERFERENCES

3.1 Response times for glass pH electrodes may be slowed by oil films on the electrode.

4.0 SAFETY

4.1 Wear appropriate gloves and safety glasses when handling acids and caustics.

4.2 Prevent spills and splashes. Wash areas (if spill occurs) thoroughly with water.

4.3 If sample has extremely high normality, splattering may occur when titrating. Therefore, analysis should be performed in the hood.

4.4 Do not breath vapors; keep samples in the hood.

5.0 APPARATUS AND EQUIPMENT

5.1 Buret - Pyrex or Kimax, 25 ml, with divisions of 0.1 ml. or equivalent. One each for acid and base titrants.

5.2 10 ml and 50 ml disposable polystyrene beakers.

5.3 pH meter

6.0 REAGENTS

6.1 pH buffers: Baker Analyzed 5657-1 (pH 4), 5655-1 (pH 10), 5656-1 (pH 7), or equivalents.

6.2 Concentrated hydrochloric acid, 12 N: Baker Analyzed Reagent 9535-3, or equivalent.

6.3 Hydrochloric acid, 3 N: Add slowly, while stirring, 258 ml of HCL acid (6.2) and dilute to 1 liter.

6.4 Sodium Hydroxide, 3 N: Dissolve 120 g of NaOH (6.5) in 800 ml of Type I water while stirring. Dilute to 1 liter.

6.5 Sodium Hydroxide: Mallinckrodt AR# 7708-5, or equivalent.

7.0 SAMPLE HANDLING AND PRESERVATION

7.1 Handle sample with extreme caution; wearing gloves and glasses.

7.2 No preservation required.

7.3 If sample fumes, store in refrigerator at 4°C.

**8.0 pH - METER CALIBRATION AND STANDARDIZATION**

8.1 Make up pH 4 and pH 7 buffer solutions by emptying the complete sachet contents into beakers and dissolving in the stated volume of distilled water. Pre-mixed and certified buffers may also be used.

8.2 Calibrate pH meter according to manufacturer's instructions. Record calibration settings in instrument log.

**9.0 QUALITY CONTROL**

9.1 Duplicates. For preacceptance samples, at least one duplicate must be analyzed per sample set or 10% of total samples. For incoming load samples, at least one duplicate analysis set must be analyzed per shift.

9.2 The normality of the titrants are checked against a primary standard on a regular basis.

9.3 Control Charts

9.3.1 Precision control charts for monitoring of relative percent difference of duplicate analysis are maintained.

9.3.2 Accuracy control charts for the normality checks are maintained.

**10.0 PROCEDURE**

10.1 Use a 10 ml disposable beaker to measure 10 ml of a liquid sample into a 50 ml disposable beaker. If the sample is solid, add 1.0 gm to 10 ml of DIW.

10.2 Stir gently with the calibrated and rinsed pH probe. Record the initial pH.

10.3 For samples with pH greater than 10.5 or less than 4.5 a titration with 3 N acid or base titrant, respectively, is performed. Titrate slowly with continuous stirring until the pH reaches 7.0.

10.4 Read and record the volume of titrant used.

10.5 Samples of high normality can use a smaller sample aliquot as required.

**11.0 CALCULATIONS**

11.1 Normality of sample =

$$\frac{\text{Normality of Titrant x Volume of Titrant (mL)}}{\text{Volume of Sample (mL or gm)}}$$

11.2 Duplicate calculation:

$$\% \text{ Difference} = \frac{(D_1 - D_2) \times 200}{D_1 + D_2}$$

where: $D_1$ = first sample value
$D_2$ = second sample value

**12.0 DATA FLAGGING AND REMEDIAL ACTION**

12.1 Data will be flagged by the analyst if data generated creates an "out-of-control" situation on the Precision or Accuracy Control Chart.

12.2 Remedial action

12.2.1 When data is flagged, the following areas are reviewed by the analyst and/or supervisor:

12.2.1.1 Calibration and standardization.

12.2.1.2 Analysis trends as indicated by control charts.

12.3 When a problem is located, sample analysis is repeated.

**13.0 REFERENCES**

Chemistry, 2nd Edition, Yoder, Claude H., Snydam, Fred H., Snavely, Harcourt Brace Jovanovich, Inc., 1980, 1975.

Standard Methods for the Examination of Water & Wastewater, 16th Edition, American Public Health Association, American Water Works Association, Water Polution Control Federation, 1985.

Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 2

# WATER REACTIVITY SCREEN

Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 2

# WATER REACTIVITY SCREEN

## 1.0 SCOPE AND APPLICATION

1.1 This method is used to screen materials for violent reactions with water.

## 2.0 SUMMARY OF METHOD

2.1 Sample is slowly added to water until a 50/50 volume/volume mixture is obtained. The mixture is observed to detect heating (more than a 15°C temperature rise) or turbulent gas evolution (more than 10% of the mixture volume).

## 3.0 SAFETY

3.1 Always add sample slowly to water, not water to sample.

3.2 Wear appropriate gloves and safety glasses.

3.3 Perform the mixing in a hood to prevent gases evolved from entering the laboratory.

## 4.0 PROCEDURE

4.1 Pour 25 ml of water into a disposable 50 ml beaker. Measure the initial water temperature. Slowly add sample until the beaker reaches the 50 ml level.

4.2 If the mixture warms significantly, use a thermometer to check temperature. If it is more than 15°C above the initial water sample temperature the sample is considered to be water reactive.

4.3 If bubbles or gas is formed causing turbulence, the sample is also considered to be water reactive due to gas evolution.

4.4 If sample is water reactive due to temperature rise and the sample has a large encugh acid or base normality to account for temperature rise due to acid or base dilution, the sample is noted to be water reactive due to acid or base

dilution.

4.5 If the reaction is questionable, the amount of sample is scaled up with 10 times the amount of water and re-tested.

## 5.0 QUALITY CONTROL

5.1 Duplicates. For preacceptance samples, at least one duplicate must be analyzed per sample set or 10% of total samples. For incoming load samples, at least one duplicate analysis set must be analyzed per shift.

5.2 Because this test yields a "yes" or "no" answer, regular quality control charts will not be kept. All discrepancies between duplicate samples must be explained and noted.

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 3

## SOLIDS SCREEN

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 3

## SOLIDS SCREEN

### 1.0 SCOPE AND APPLICATION

This is a rapid and accurate method for determining the total solids content of liquids, sludges and solid samples by drying to maximum weight loss at approximately 105°C.

### 2.0 SUMMARY OF METHOD

An approximate 10 grams of sample are accurately weighed and dried on a moisture balance. Weights before and after drying are compared to calculate % solids.

### 3.0 INTERFERENCES

Underheating and/or inadequate drying time will not remove all components normally volatilized at 105°C. Adequate heater and timer settings are developed for each type of sample to prevent these interferences.

### 4.0 SAFETY

4.1 This method should not be used with explosives or ignition could result.

4.2 Appropriate gloves and safety glasses should be worn while handling samples.

4.3 This method should be performed in the hood to prevent volatile compounds from entering the laboratory atmosphere.

### 5.0 APPARATUS AND EQUIPMENT

Ohaus Moisture Determination Balance Model 6010 with aluminum sample pans.

### 6.0 QUALITY CONTROL

6.1 Duplicates. For preacceptance samples, at least one duplicate must be analyzed per sample set or 10% of total samples. For

incoming load samples, at least one duplicate

analysis set must be analyzed per shift.

6.2 Control Samples are run on a regular basis.

6.3 Quality Control Charts are kept for monitoring precision (duplicates), and accuracy (control samples).

**7.0 PROCEDURE**

7.1 Approximately 10 grams of well mixed sample are accurately weighed onto a tared aluminum sample pan on the moisture balance. This weight is the initial weight.

7.2 The temperature setting is checked weekly when the control sample is run. The setting will be recorded on the control chart log. This will be the setting used each week. Set the timer setting at 10 minutes. Check sample at end of time, if free liquids are still present heat an additional 5 minutes.

7.3 % total solids is calculated using the formula:

$$\% \text{ total solids} = \frac{\text{Final Weight} \times 100}{\text{Initial Weight}}$$

**8.0 REFERENCES**

Instructions for Ohaus Moisture Determination Balance Model 6010, 1982.

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 4

# REACTIVE CYANIDES AND REACTIVE SULFIDES SCREEN

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 4

## REACTIVE CYANIDES AND REACTIVE SULFIDES SCREEN

### 1.0 SCOPE AND APPLICATION

This method provides a rapid qualitative test to determine the potential for samples to generate HCN or $H_2S$ upon acidification.

### 2.0 SUMMARY OF METHOD

A small amount of sample is acidified to pH $\leq$ 2 using nitric acid and the atmosphere above the sample is tested using Drager detector tubes for hydrogen cyanide and hydrogen sulfide.

### 3.0 SAFETY

3.1 Wear appropriate gloves and safety glasses.

3.2 This test must be performed in a hood to prevent poisonous HCN and/or $H_2S$ from escaping into the lab atmosphere.

### 4.0 INTERFERENCES

According to the Drager tube handbook there are no interferences that prevent sensing of HCN, however it has been documented from time to time that unknown substances will cause the tube to turn an orange rather than the tell-tale blood red. Also, the white from part of the tube will turn black in the presence of $H_2S$. Sulphur dioxide may increase the measured concentration value of $H_2S$, but will not prevent $H_2S$ from being detected.

### 5.0 PROCEDURE

5.1 Approximately 25 ml of sample is placed in a disposable 50 ml beaker and acidified with 3 normal nitric acid until the pH is 2.0. Samples with initial pH values at or below 2.0 need not be acidified further.

5.2 While the sample is being acidified, the atmosphere directly

above the sample is tested using a Drager gas detector.

Sample tube Hydrogen Cyanide 2/a is used for HCN detection and sample tube Hydrogen Sulfide 100/a is used for $H_2S$ detection. The HCN tube needs five pumps; the Sulfide tube one.

5.3 If appropriate, additional analysis will be performed using either EPA Method SW-846-9010 for cyanide or EPA Method SW-846-9030 for sulfides.

6.0 QUALITY CONTROL

6.1 Duplicate samples are run at least once every set of 10 pre-acceptance samples.

6.2 Discrepancies (positive vs. negative results) between duplicate samples must be explained.

Clean Harbors Kansas, LLC
Analytical Procedures

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 5

# EXPLOSIVITY METER VAPOR TEST (TLV SNIFF)

Revision No.13
September 03,2010

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 5

## EXPLOSIVITY METER VAPOR TEST (TLV SNIFF)

### 1.0 SCOPE AND APPLICATION

The TLV Sniffer is an extremely sensitive combustible gas and vapor sensing instrument; equipped with an audible alarm that can be set to sound at any desired level of gas concentration. The TLV is also useful for locating gas leaks. Another function is continuous self monitoring.

### 2.0 SUMMARY OF METHOD

To detect and measure concentrations of combustible gas in the air, the TLV Sniffer catalytically oxidizes gas in a pumped in sample of air by means of a catalyst-coated resistance element. The resistance of this element changes with changes in temperature that are proportional to the amount of oxidized gas, thereby altering the electrical balance of the catalytic element as compared to the resistance of a reference element. Both the catalyst-coated ("active") element and the reference element are incorporated in a Wheatstone Bridge circuit in such a way as to produce an electrical output proportional to their differences in resistance. Since any changes in air sample temperature and humidity affect both active and reference elements equally the electrical signal output is proportional to the concentrations of combustible gas or vapor in the sample of air (expressed in volumetric terms as ppm). However, sudden changes in humidity may affect the zero reading on the X 1 range. The instrument, therefore, should be zeroed at the sam R.H. prevailing during use.

### 3.0 INTERFERENCES

3.1 Improper calibration of instrument or setting meter zero in the presence of impure air will cause inaccurate readings.

3.2 Wisps of cigarette smoke, fumes from autos, and subtle air contaminants from other sources may affect zero setting.

4.0 SAFETY

If high volumes of gas are detected or suspected, a respirator should be worn. No flames or sparks should ever be present.

5.0 APPARATUS AND EQUIPMENT

5.1 TLV Sniffer - Bacharach by United Technologies, or equivalent.

5.2 Gas Calibration Kit - Bacharach, Code 51-7139, or equivalent.

6.0 REAGENTS

None

7.0 SAMPLE HANDLING AND PRESERVATION

Keep sample container tightly sealed. DO NOT open until starting analysis. If highly volatile, refrigerate sample at 4 degrees Celsius.

8.0 CALIBRATION AND STANDARDIZATION

8.1 Battery test:

Turn MODE SELECTOR knob from OFF position to BATT TEST position. Meter pointer should come to rest in BATTERY GOOD range of meter scale. (Both a meter reading below BATTERY GOOD range and an audible signal warn of batteries too weak to sustain normal operation).

8.2 Setting meter pointer to zero:

8.2.1 Attach air sampling probe connector to instrument intake on left side of case by pulling back spring collar of connector, pressing connector over intake, and releasing spring collar.

8.2.2 Place TLV Sniffer in position in which meter indications will be read (usually in meter up position).

NOTE: Heat distribution from active and reference filaments of the detector sensor changes from vertical

to horizontal position. The resulting change in electrical balance between elements causes a shift in pointer zero from one position to the other.

8.2.3 Set MODE SELECTOR switch to ppm x 100 and operate instrument for 10 minutes to allow circuits to stabilize.

8.2.4 In fresh air, set ZERO ADJUST knob at midpoint (five full turns from either extreme position). If fresh air is not available, use Bacharach Kit 51-7199 to apply known pure air to the Sniffer intake (instructions in kit).

8.2.5 Turn coarse adjustment screw, located under ZERO ADJUST knob, to move meter pointer to zero on the meter scale.

8.2.6 Turn MODE SELECTOR to ppm x 10 position and turn AERO ADJUST knob to set pointer to meter zero.

8.2.7 Turn MODE SELECTOR to ppm x 1 position and turn ZERO ADJUST knob to set pointer to zero.

NOTE: The TLV Sniffer is extremely sensitive in the ppm x 1 range. $CO_2$ from breath too close to the intake, cigarette smoke, auto fumes, etc., can interfere with accurate setting of the pointer to meter zero.

8.3 Setting meter pointer deflection (gain calibration).

To insure proper operation and to check calibration, it is necessary to periodically check the instrument against a known standard blend of calibration gas.

The Bacharach Code 51-7199 gas calibration kit and optionally available Code 51-1120 rectified gas cylinder containing 500 ppm hexane in air are readily available to meet this requirement.

Connect the gas transfer assembly, making certain all connections are air tight. Use the retaining clips (2 each) to mount Flowmeter (06-6163) to its mounting bracket (51-1201). Make certain to connect rubber tubing at the base inlet connection on the flowmeter, then to the barbed fitting on the regulator and to the quick connect fitting previously installed on the TLV sample inlet (inlet

fitting). Turn regulator valve (03-4318) fully counterclockwise (close position) before attempting to screw regulator into calibration gas tank. This test is to be performed in a clean, fresh air (combustible free) environment. If this is not possible, substitute Code 51-7131 zero calibration gas for the Code 51-1120 cylinder of hexane-air mixture.

Connect the gas transfer assembly at the TLV sample in (inlet) fitting.

Open the regulator valve (clockwise) and adjust for flowmeter indication of (1) cfh to ensure adequate pump flow.

Remove Code 51-7131 zero calibration gas and substitute the Code 51-1120 cylinder of hexane-air mixture before proceeding with Step 6.

To calibrate the instrument in fresh air (combustible free) environment, proceed as follows:

8.3.1 Remove case cover for access to internal adjustments and temporarily break gas transfer assembly connection at the TLV Sample-In (inlet) fitting.

8.3.2 Turn FINE ZERO ADJUST (pot) full clockwise and then five turns counterclockwise to mid-range. Then turn COARSE ADJUST (pot) full clockwise and ten turns counterclockwise to mid-range.

8.3.3 Turn MODE SELECTOR to BATT TEST position. The meter pointer must indicate within BATTERY GOOD range, if not recharge.

Connect a Voltmeter between TP-3 (+) and ground (-), check for 6 VDC. If not, adjust for 6 VDC +/- 0.01 VDC.

8.3.4 After allowing for five minute warm up, turn MODE SELECTOR switch to ppm x 100 position and adjust R-13 for meter pointer indication of scale zero.

8.3.5 Turn MODE SELECTOR switch to ppm x 10 position and adjust COARSE ADJUST or meter pointer indication of scale zero. Readjust per steps 4 and 5 until meter pointer indicates a relatively constant scale zero when

MODE SELECTOR is switched between ppm x 100 range.

8.3.6 Turn MODE SELECTOR switch to ppm x 10 position. Reconnect gas transfer assembly to TLV sample inlet fitting. Open regulator valve (clockwise) and adjust for flowmeter indications of (1) cfh to ensure adequate pump flow. Allow one minute for meter pointer to achieve maximum indication, adjust R-3 the x10 span adjuster until meter pointer indicates mid-scale (50) or 500 ppm. Remove gas, close regulator valve (fully CCW) and allow about two minutes for meter pointer to return to zero.

8.3.7 Turn MODE SELECT switch to ppm x 10 position. Then turn the FINE ZERO ADJUST until meter pointer indicates full scale 1000 ppm. Turn MODE SELECT switch to ppm x 100 position and adjust R-4 the x 100 span adjuster until meter pointer indicates scale zero.

8.3.8 Turn MODE SELECT switch to ppm x 10 position, then turn FINE ZERO ADJUST until meter pointer indicates 10 in the scale or 100 ppm.

8.3.9 Turn MODE SELECT switch to ppm x 1 position and adjust the x 1 span adjuster until meter pointer indicates 100 (full scale) or 100 ppm.

8.3.10 Turn FINE ZERO ADJUST until meter pointer indicates scale zero, the TLV is now calibrated and ready for use on the low range 0-100 ppm as a gas leak detector.

8.4 Resetting alarm response. If factory set alarm response at midpoint of the meter scale is not suitable, reset alarm response level as follows:

8.4.1 Turn meter zero coarse adjustment screw (located under ZERO ADJUST control knob at lower left on instrument panel) to set meter pointer to desired alarm point on meter scale.

8.4.2 Turn ALARM potentiometer adjustment screw until audible alarm sounds.

8.4.3 Turn meter zero coarse adjustment screw to return pointer to zero on meter scale.

8.5 Setting recording level. If recorder (range: 0-100 mv; impedance: 10,000 lhms or greater) is to be used, attach accessory recorder jack to RECORDER plug in right side of instrument case and set recording level as follows:

8.5.1 Set MODE SELECTOR knob to ppm x 100 or ppm x 10 as desired and apply combustible gas to instrument intake.

8.5.2 Turn RECORDER potentiometer adjustment screw until accessory recorder response corresponds with meter readings as desired.

**9.0 QUALITY CONTROL**

9.1 Calibration of the unit should be verified each day.

9.2 Duplicate samples are tested in each pre-acceptance sample batch or every 10 samples, whichever is more frequent. A quality control chart is kept on the duplicate sample values.

**10.0 MONITORING TOXICITY**

10.1 Monitor combustible gas and vapor to determine concentrations with respect to Threshold Limit Values as follows:

10.1.1 Turn MODE SELECTOR control knob to BATT TEST position and read condition of battery on meter dial. Install new recharged batteries, if necessary.

10.1.2 Turn MODE SELECTOR control to desired operating range, selected in accordance with the Threshold Limit Value for the toxic gas to be monitored (ppm x 1 for TLV from 0 to 100 ppm; ppm x 10 for TLV from 0 to 1,000 ppm; ppm x 100 TLV from 0 to 10,000 ppm).

10.1.3 Allow ten minute warm-up period with instrument in same position as it is to be used in service (meter facing up or meter facing to the side).

10.1.4 In fresh air before entering monitoring area, turn ZERO ADJUST control knob until meter pointer resets on zero.

10.1.5 For monitoring in noisy areas, insert jack of accessory earphone in plug on right side of instrument case.

10.1.6 Enter monitoring area and read ppm gas concentrations on meter. Audible warning sounds if gas concentration causes readings at midpoint of scale or above, or if toxic Threshold Limit Value has been exceeded, provided the alarm has been set for this response.

10.1.7 For readings above 10,000 ppm: Replace probe assembly 0023-7243 with dilution probe 0023-7355 and slide dilution probe 0-ring to expose dilution holes of probe (extends range 10 x to read up to 100,000 ppm). Add in line filter and trap assembly, if sampling in dust or moisture laden areas.

10.2 Converting Hexane-calibrated meter ppm readings to ppm readings for other gases. Hexan gas is commonly used for factory calibration and subsequent in service recalibrations of the TLV Sniffer. To determine ppm concentrations of gases other than hexane with instruments calibrated for hexane, multiply the ppm meter reading by the factor for the gas detected.

10.3 Converting ppm readings to percent level of lower explosive limit (% L.E.L.). To determine gas concentration levels in terms of percent of lower explosive limit from direct ppm readings for hexane or from calculated ppm concentration levels for other gasses:

10.3.1 Read ppm on TLV Sniffer indicating meter.

10.3.2 On 0-to-10,000 "ppm concentration in sample" horizontal scale at bottom of % L.E.L. Conversion chart (attached), locate position left to right representing ppm reading.

10.3.3 On slanted chart line representing kind of gas detected, find the point in vertical alignment over ppm reading point on horizontal scale.

10.3.4 Locating gas leak sources. To utilize the TLV Sniffer in searching for gas leaks in tanks, pipes, hoses, containers, etc.:

10.4.1 Set MODE SELECTOR control knob to ppm x 1 position.

10.4.2 Search for exact location of leak with probe. Meter

reading will increase as leak is approached and

decrease as probe moves away from leak.

10.5 TLV sniff test procedure for sample fingerprint analysis.

10.5.1 The TLV sniffer probe is held over the surface (within 0.5 cm) of the sample. A positive reading indicates the possibility of volatile organics in the sample.

10.5.2 A reading over 200 ppm indicates the possibility of flammability and a flash point analysis is performed to test for flammability.

**11.0 CALCULATIONS**

TLV = ppm reading x scale

**12.0 DATA FLAGGING AND REMEDIAL ACTION**

12.1 Data will be flagged if:

12.1.1 Data generated creates an "out of control" situation on the precision control chart.

12.2 Remedial Action

12.2.1 When the data is flagged, the following areas are reviewed by the analyst and supervisor:

12.2.1.1 Analysis trends as indicated by control charts.

12.3 When a problem is located sample analysis is repeated.

**13.0 REFERENCES**

Instruction Manual TLV Sniffer, United Technologies Bacharach, Instruction 23-9613, Rev. No. 1, September, 1982.

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 6

## CHK - 6)

## OXIDIZER SCREEN

Revision No. 13
September 03,2010

# Clean Harbors Kansas, LC ANALYTICAL PROCEDURE 6

## OXIDIZER SCREEN

### 1.0 SCOPE AND APPLICATION

This method is a rapid qualitative method for determining the presence of oxidizing materials in liquids and sludge samples.

### 2.0 SAFETY

2.1 Wear appropriate gloves and safety glasses when handling hazardous samples.

2.2 Perform analysis in the hood to prevent contact with sample vapors.

### 3.0 PROCEDURE

Wet a strip of KI - starch paper in HCl. Dip the wetted strip into the sample. Note the color that develops. Anywhere from light brown to dark purple or black indicated that oxidizing material is likely present. Light brown is generated on contact with nitric acid and deep purple forms on contact with hydrogen peroxide.

### 4.0 QUALITY CONTROL

At least one duplicate must be analyzed per sample set or for every 10 samples, which ever gives the greater frequency.

Clean Harbors Kansas, LLC
Analytical Procedures

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 7

# RADIOACTIVITY SCREEN

Revision No.13
September 03,2010

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 7

## RADIOACTIVITY SCREEN

### 1.0 SCOPE AND APPLICATION

This method is to detect the presence of any radioactive material in a representative sample of waste.

### 2.0 SUMMARY OF METHOD

To detect and measure the presence of radioactivity in a sample it will be placed within six inches of a scintillation detector. A scintillation detector is capable of measuring low-level gamma radiation in micro R/hr.

### 3.0 INTERFERENCE

No known interferences.

### 4.0 SAFETY

Treat all samples as if hazardous. Wear appropriate gloves, safety glasses, and lab coat. The sample container does not have to be opened to perform the test.

### 5.0 APPARATUS AND EQUIPMENT

Ludlum Model 19 Micro Rad Meter, or equivalent.

### 6.0 REAGENTS

None required.

### 7.0 SAMPLE HANDLING AND PRESERVATION

No preservation is needed. Keep sample tightly sealed. Place entire sample within six inches of the detector.

### 8.0 CALIBRATION AND STANDARDIZATION

The meter is to be recalibrated annually by the manufacturer.

## 9.0 QUALITY CONTROL

None.

## 10.0 PROCEDURE

10.1 Prior to turn-on, place the response switch in the S (slow) position and place audio switch in the off position.

10.2 Turn-on the meter by placing meter on the 0 to 50 micro R/hr scale.

10.3 Depress the BATT Test Button. If the meter pointer is below the check line replace the meter's batteries.

10.4 Depress the R (reset) Button. Check to see if meter pointer returns to Zero.

10.5 The meter is ready for use. Allow the meter to return to background activity approximately 10 to 20 micro R/hr Response time should be 10 to 15 seconds.

10.6 Place sample within six inches of the detector located in the front of the meter. Allow 10 to 15 seconds for meter response. If reading is less than 40 micro R/hr above background the test is negative. Any readings which are greater, the General Manager or Lab Manager will be notified.

## 11.0 CALCULATIONS

The meter is a direct readout. Ensure meter is set on the proper scale.

## 12.0 PRECISION AND ACCURACY

No historical data is available at this time.

## 13.0 DATA FLAGGING AND REMEDIAL ACTION

13.1 Data will be flagged by the analyst if readings exceed 40 micro R/hr above background.

## 14.0 REFERENCES

Instruction Manual for Ludlum Model 19 MICRO R Meter, Ludlum

Clean Harbors Kansas, LLC
Analytical Procedures

Measurement Inc., Sweetwater, Texas.

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURES 8

## FIXATION REQUIREMENT
## (RECIPE)

Revision No. 13
September 03,2010

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 8

## FIXATION REQUIREMENTS (RECIPE)

### 1.0 SCOPE AND APPLICATION

This test is for determining the amount of reagents (fly ash, cement kiln dust, lime, cement, silicate based reagents, activated carbon, water, etc...) that must be added to waste streams containing free liquids to stabilize the waste stream or to pass treatment standards.

### 2.0 SUMMARY OF METHOD:

A weighed amount of sample is mixed while slowly adding reagent(s) until no free liquids can be seen. The mixture is then weighed and the ratio of sample to reagent(s) is recorded. The mixture is then subjected to the Paint Filter Liquids Test (Methods 9095), more reagent(s) is (are) added until the Paint Filter Liquid Test indicates no free liquids. The final ratio of reagent to sample is the one used for waste stream stabilization prior to disposal. To determine if the mixture meets the treatment standard, the mixture must be subjected to the appropriate test procedure.

### 3.0 SAFETY

Wear appropriate gloves and safety glasses when handling samples.

### 4.0 PROCEDURE:

4.1 Weigh approximately 25 grams of sample into a 50 ml disposable beaker.

4.2 Gradually add reagent(s) and mix until no free liquids are observed. Weigh mixture.

4.3 Subject mixture to Paint Filter Liquids Test (Method 9095) or to TCLP if the mixture is to meet CCWE treatment standards.

4.4 Add more reagent(s) if free liquids are found with method 9095.

4.5 Determine final ratio of reagents(s) to sample for adequate fixation of free liquids or to meet treatment standards.

## 5.0 QUALITY CONTROL

5.1 Duplicate samples are run for 1 sample in 10.

5.2 Quality control charts are kept to indicate the method precision on duplicate samples.

## 6.0 REFERENCES

SW-846 Method 9095 40 CFR Part 268

Clean Harbors Kansas, LLC
Analytical Procedures

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 10

## REDUCER SCREEN

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5.2.3 Dilute starch solution 1:1 with deionized water. Allow to cool to room temperature.

5.2.4 Add 1 gm of elemental iodine to 50 ml of ethyl alcohol. Stir until all the iodine is dissolved.

5.2.5 After starch is cool, add 10 ml of iodine solution to starch. Place this mixture in a dark bottle and store in a dark place.

**6.0 PROCEDURE**

6.1 A starch solution produces a deep blue color in the presence of elemental iodine. A reducing agent present in a sample will donate an electron to the iodine and clear the solution.

6.1.1 Transfer 1 gm of sample to a 55 ml disposal beaker.

6.1.2 Add 10 ml deionized water.

6.1.3 Adjust the pH to < 8 with 1:1 acetic acid.

6.1.4 Add 20 ml indicator to another 55 ml beaker.

6.1.5 Add 10 drops of the pH adjusted sample solution to the beaker of indicator.

6.1.6 The blue color will fade if a reducing agent is present.

**7.0 QUALITY CONTROL**

7.1 Samples should be tested in duplicate at a frequency of not less than 10%.

7.2 A positive can be found using a solution of sodium thiosulfate.

**8.0 REFERENCES**

Standard Methods for Examination of Water and Wastewater, 16th Ed.

Analytical Chemistry, 4th Ed,. Gary Christian.

Clean Harbors Kansas, LLC
Analytical Procedures

# Clean Harbors Kansas, LLC ANALYTICAL PROCEDURE 11

# EXTRACTION FOR SOLIDS

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